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ABSTRACT

This study tests a proposition derived from Wittgenstein's theory of language development, which suggests that a social activity framework shared by interacting members serves two primary functions. Just as the activity framework prepares the child to comprehend speech relevant to the shared activity, (Function One), so it prepares the parent to generate speech relevant to the shared activity (Function Two). These functions are thought to be jointly necessary to ensure transmission of language from one generation to the next. Prior research has shown that such frameworks determine how children comprehend novel speech constituents (Function One). However, if Function One for shared activity frameworks is correct, then under natural conditions the activity framework itself should determine the content of the utterances which parents address to children (Function Two). Therefore, the spontaneous speech of mothers while they helped their children perform matching-games was investigated. Analyses of speech from 24 mothers, who interacted with their three-year-olds in the contexts of three matching-games, revealed that parents and children share criteria of remarkability. That is, parents often give expression to what children would themselves note, if they had the linguistic means. These results are taken to confirm the first function proposed for shared activity frameworks. (Author/RH)

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Determinants of word-choice in mothers' speech to three-year-olds

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Determinants of Word Choice in Mothers' Speech to Three-year-olds

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Abstract

This research addressed the question of whether mothers, when interacting with their young children, follow criteria of remarkability similar to those previously found to govern the speech, and learning, of young children. Prior research has shown that both task factors and novelty determine what children find remarkable. Analyses of speech from 24 mothers, who interacted with their three-year-olds in the contexts of three matching-games, show that in such contexts mothers do follow criteria of remarkability similar to those governing their children's speech. Such dyadic agreement about what's remarkable may be crucial for rapid language development.

Determinants of word-choice in mothers'

speech to three-year-olds

In recent years, Wittgenstein's later perspectives on cognition and language (e.g., Wittgenstein, 1953) have begun to serve as a fruitful basis for research by experimental psychologists. A notable example is the research on prototype theory (e.g., Rosch, 1973), which has built upon Wittgenstein's insights on non-analytic concept formation and the internal structure of natural categories. Another example, which introduces the topic of this paper, is research based on Wittgenstein's view that language development in impossible outside the context of shared (i.e. social) activity frameworks.

This theme has been discussed by Bruner (1975), Ratner and Bruner (1978), and Wertsch (1979). However, none of these authors has articulated the precise function of shared activity frameworks in language development. As a first step in this direction, Bullock (1979) has suggested that an activity framework shared by the members of an interacting parent-child dyad serves two primary functions, which are jointly necessary to ensure transmission of the language from one generation to the next. The two proposed functions of the shared activity framework are: (1) to determine the content of the utterances which the parent directs to the child; and (2) to determine how the child comprehends such utterances and their constitutive properties (including novel constituents).

These functions can be seen to complement one another to promote language development: just as the activity framework prepares the child to comprehend speech relevant to the shared activity, so it prepares the parent to generate speech relevant to the shared activity.

This paper reports phase two of a research program designed to test these two claims. In phase one (Bullock, 1979), the proposed second function was tested as follows. Three-year-old children interacted with a familiar experimenter in one of two game contexts. Each trial of both games required that the child search a three-object set to find an object which matched a standard object held by the experimenter. In game one, the choice set was so constituted that the child couldn't find a perfect match. Through feedback, the child was brought to routinely search for an object matching the standard in color. In game two, to the contrary, a perfect match was available in the search set. Furthermore, the child could locate this object by operating with reference to the standard's size, texture, or color.

Given these particulars, it was possible to arrange the following conditions. In both game contexts, after performance had stabilized, children heard precisely the same three utterances from the experimenter (presented in a natural conversational style). All utterances used the same novel adjective in reference to tokens of the same standard object in both game contexts. As predicted, only in game one, where exclusive color-focusing was obligatory for correct game performance, did children reliably interpret the novel adjective as a color-word. Thus the shared activity framework (color-matching game) itself determined how the children comprehended a novel constituent of heard utterances. This conclusion is firmly established because game one differed from game two only in game-performance demands. Verbal input, standards, and the referential relations between adjectives and standards were all equated. Furthermore, the results were replicated in an experiment where game one involved texture matching and the novel adjective was a texture-word.

In the research just summarized, the verbal input was experimentally controlled. But if proposed function one for shared activity frameworks is correct, then under natural conditions, the activity framework itself should determine the content of the utterances which parents address to children. In the experiment reported below, we examined the spontaneous speech of mothers while they helped their children perform matching games similar to those just described. The empirical question was: Would the spontaneous verbal behavior of the mothers be controlled in the predicted manner by the performance demands of the games? However, as will be seen, this question addresses only one of (at least) two factors which can be shown to determine what both children and their interlocutors are likely to find worthy of mention.

Method

Subjects

Participants in the study were 25 mother-child dyads, one of which was dropped from the analysis due to failure to complete the matching games. Equal numbers of mother-daughter and mother-son dyads were assigned to each of six orders of three games. All participants were recruited from the clientele of Bing Nursery School, a research facility at Stanford University. The children ranged in age between 2;10 and 3;5 (years;months).

Procedure

Dyads were shown to a small carpeted room equipped with a table, two child-sized chairs, a tape-recorder, and the matching games. The latter were similar to those used in Bullock (1979), but the format was altered to make them more readily comprehensible.

Each dyad played three games. Game C involved color-matching, game T involved texture-matching, and game N (for "neutral") could involve either,

or both, types of matching, at the dyad's discretion. For each game type, there were five consecutive trials, and the order of game-types was counterbalanced across dyads. Thus four dyads received five "C" trials, then five "T" trials, then five "N" trials, while four other dyads received the reverse order, etc., with all six possible orders sampled equally.

To each dyad, the session appeared as an uninterrupted series of 15 tasks. Each task (trial) presented the child with a partially-dressed doll (drawn in outline form on an 11 x 17 in. sheet of white card-stock paper). The child's task was to look at the trousers (or shirt) already glued-in-place on the doll, and to select the best matching shirt (or trousers) to complete the outfit. A three-item choice set was always located to the immediate right of the doll. If the doll wore trousers (a shirt), this set contained three shirts (trousers) varying in color, texture, or both.

In trials from game C, all three choice-set items matched their standard (i.e., the glued-down item) in texture, but only one item (the correct choice) matched it in color. Thus within each trial of game C, texture was not informative, and could be ignored. However, the texture of game C standards did change across trials.

The above description also holds for game T trials if "color" and "texture" are interchanged throughout the description. However, in trials from game N, one member of the choice set matched the standard in color but not texture, one in texture but not color, and one in neither way. Thus participants could choose color or texture as the basis for searching for a match on game N trials (see Table 2 for summary).

The mothers were told that we were interested in natural teaching strategies, and that they should treat the session as if it were just another episode of game-playing on the living-room floor. They were then urged to help their

children find the best-matching outfit, but not to perform the task in the child's stead. Thus they had no idea that they were about to encounter three distinct games. The experimenter started the tape recorder prior to leaving the room.

Results

The primary descriptive analysis is summarized in Table 1. Transcripts of the tapes were exhaustively searched for mothers' words relevant to textures, and for mothers' words relevant to colors. Examples of words of the former type were: bumpy, rough, material, burlap, feel. Examples of words of the latter type were: color, pink, orange, greenish-blue, dark. Each use of any such word added to the counts in Table 1, i.e., Table 1 reports frequencies of word tokens.

The hypothesis that mothers' verbal behavior would be determined by the activity framework (game-type) is supported in all six replications: as predicted, word-usage patterns vary as a function of game type. Overall, the ratio of color words to texture words was 4.09/1 (200:49) in the color game, and 1/3.53 (76:258) in the texture game. These data yield a highly significant chi-square ($X^2_{(1)} = 189.63$, $p < .001$).

Though significant, these frequency differentials may be underestimates of differentials found under natural conditions, where rapid reversals of dimensional relevance are not the rule. Thus it is instructive to look at the differentials found for the color and texture games when these were first in their game sequences. Calculating from Table 1, the first-position color-game ratio was 13.99/1 (97:7, for CNT and CNT combined); and the first-position texture-game ratio was 1/6.23 (22:137, for TCN and TNC combined). These extreme ratios should be viewed against the neutral-game ratio, which was exactly 1/1 (236:236) overall. We believe such extreme bias in mothers' usage

may be crucial for the rapid lexical acquisition observed in nature.

One final trend from Table 1 deserves mention. There appears to be a linear increase in combined color and texture word-tokens across the color (249), texture (334), and neutral (472) games. The following explanation is tentatively offered. The neutral game count should be highest because the basis for matching was not "given" by the nature of the array of alternative outfits. Rather, it was left for dyadic negotiation, and such negotiation requires more discussion of item attributes. Similarly, it might be proposed that color-matching is more prototypical for matching games than texture-matching. By departing from the prototypical, the texture-game calls for more maternal guidance, hence more maternal discussion of attributes. This "color-bias" hypothesis is supported by the finding that the color-texture word ratio for first-position color-games is twice the inverse ratio for first-position texture games, i.e., 13.99/1 is twice as extreme as 1/6.23 (see preceding paragraph). The color-game admits relatively fewer mentions of texture than the texture-game does of color, indicating a presumption in favor of color.

Novelty analysis

In Bullock (1979), it was shown that children were sensitive to an attribute's novelty, in addition to its relevance within a given activity framework. Having demonstrated mothers' sensitivity to attribute relevance, it is of interest to examine whether their word-usage indicates that mothers also share their children's sensitivity to novelty.

For the purposes of this analysis, it is necessary to consider Table 2, which abstractly specifies the attribute values used to construct the game items. The target values for the novelty analysis are C_4 and T_4 (; C_4 was aqua-colored, and T_4 was bumpy-textured). Each of these values appeared only 8 times, compared to a minimum of 13 times for all other attribute values.

By making them rare, we hoped to make them more "remarkable." Given an adequate base-rate of being mentioned at some point, it would be possible to examine whether the probability of mention was high when the value was new (i.e., first seen as a standard) but predictably lower thereafter.

Table 3 summarizes the relevant data. Consider row one. Column one indicates that this row summarizes data from the four dyads which saw the games in order C, N, T. Column two indicates that numbers in the upper half of the row show the percentage of color-relevant words which referred to C_4 (i.e., $C_4/\Sigma C$ means "the number of C_4 words divided by the total number of color-relevant words"), and that numbers in the lower half of the row show the percentage of texture-relevant words which referred to T_4 ($T_4/\Sigma T$). These percentages are then reported for each game in which C_4 or T_4 appeared.

As Table 2 indicates, attribute values C_4 and T_4 co-occurred in a single standard only on trial four of the neutral game. By looking at word-usage during the neutral game, we can estimate the relative "remarkability" of C_4 and T_4. The percentages in the neutral column show that T_4 was, overall, much more remarkable than C_4 ($.258 > .068$). Indeed, the T_4 percentage exceeds the C_4 percentage in all six replications.

The first bit of evidence for mothers' sensitivity to novelty can be found in the last column of Table 3. Next to the column of neutral-game percentages is the difference within pairs. (The following ignores the NCT difference of .737, since this outlier is based on a total of only 21 words, compared to a minimum of 80 words in all other cases). That all differences are positive simply reiterates the dominance of T_4. Note, however, their ordering by magnitude:

$$\begin{matrix} \Delta_{\underline{CNT}} = .236 \\ \Delta_{\underline{TCN}} = .205 \end{matrix} > \Delta_{\underline{NTC}} = .184 > \begin{matrix} \Delta_{\underline{CTN}} = .160 \\ \Delta_{\underline{TNC}} = .030 \end{matrix}$$

(Here "N" is underlined as a reminder that the data come from game N). Note that the difference was inflated when game N was immediately preceded by game C, but deflated when game N was immediately preceded by game T.

The explanation in terms of relative novelty is straightforward. As can be seen from Table 2, when game C preceded game N, C_4 would be old relative to T_4 (i.e., more recently seen than T_4), hence it would not compete for lexicalization as well as might be expected. Similarly, when game T preceded game N, T_4 would be old relative to C_4, hence would not compete as well as expected. The expected, of course, is estimated by the first-position neutral-game usage, namely $\Delta_{\underline{NTC}} = .184$.

In applying the novelty hypothesis to the remainder of the table, we first deduce the following predictions for the quantity $T_4/\Sigma T$:

1. $\underline{TCN} > N\underline{CT}$
2. $\underline{TCN} > N\underline{TC}$
3. $\underline{TCN} > C\underline{NT}$
4. $\underline{TNC} > N\underline{CT}$
5. $\underline{TNC} > N\underline{TC}$
6. $\underline{TNC} > C\underline{NT}$
7. $C\underline{TN} > C\underline{NT}$
8. $N\underline{TC} = C\underline{NT}$

Of these predictions, only the fourth is violated by the data. This violation, however, is produced by data from condition NCT. The extremely low raw frequencies for this condition also produced the deviation excluded from analysis of results for the neutral game (see preceding analysis).

Discussion

The principal results of this study confirm the first function we proposed for shared activity frameworks: such frameworks determine the content of mothers' speech to young children. Prior results (Bullock, 1979) have confirmed the second proposed function: such frameworks determine how children comprehend novel speech constituents. Together, these functions help resolve an apparent paradox raised by Macnamara's (1972) discussion (and nearly every subsequent discussion) of language learning in infancy. In order to explain rule-learning, Macnamara had to assume that the child could come to know the meaning of utterance constituents before learning the rules which govern the use of those constituents. But in most cases, one must already know the rules for using constituents if one is to calculate the meaning of an utterance from its constituents. Thus accepting Macnamara's assumption requires that we elucidate some process whereby the child is able to reliably assign correct meanings to utterances without using the very constituents whose function is to be learned.

If the present approach is correct, then the solution to this problem is to be found, in part, by tracing the ramifications of a crucial social fact: parents and their children generally interact in the context of one or another shared activity framework. This is as true of children in traditional cultures as it is of middle-class children with their scale models and form-giving games. As Wittgenstein noted, every culture is a composite of determinate "forms of life" (activity frameworks), each with its correlated "language game" (Wittgenstein, 1953). Such shared frameworks inform (i.e., give-form-to) dyadic interactions, parents' utterances, and children's interpretations of those utterances. The concept of shared activity frameworks helps explain language

acquisition by explaining how there naturally arises a sufficient number of occasions on which the child is prepared to correctly interpret entirely novel constituents of parental utterances. Similarly, it helps explain how parents are in a position to correctly identify what children are trying to say before their production skills are fully adequate to linguistically encode their communicative intentions.

The present research and that of Bullock (1979; in preparation) also suggest that other factors give form to parents' utterances and children's interpretations. In addition to such "top-down" factors as goals and activity frameworks, it is essential to consider "bottom-up" (see Rumelhart, 1977) factors, such as the relative novelty of perceived attributes. From the research reported here and elsewhere it seems safe to conclude that children and their parents, when interacting, are similarly sensitive to relative novelty. This similarity in psychological operating characteristics could be expected to increase the liklihood that a parent will comment on an event at just the time when the child's attention is captured by it, i.e., at a time when the child is prepared to correctly interpret the point of the parent's comment.

Taken together, the results on activity frameworks and sensitivity to novelty suggest that parents and children share criteria of remarkability. That is, given any two events which vary on (1) their relevance to the ongoing activity or (2) their relative novelty, or both, parent and child will come to similar conclusions about which event is more worth remarking. If so, then parents will often give expression to what children would themselves note, if they had the linguistic means.

Because of this agreement about what's remarkable, children readily identify the functions or uses of novel linguistic devices. Thus there is much to recommend

an emphasis on the social foundations of language (see Bruner, 1975; Kaye and Charney, 1980; Wittgenstein, 1953). However, as Pinker's (1979) recent review of formal models of rule-induction indicates, it is a long road from social foundations to an integrated model of language development. We anticipate that further progress will hinge, in part, on a more powerful description of the organizing function performed by activity frameworks, perhaps along the lines recently sketched by MacWhinney (1980).

References

Birch, D. & Atkinson, J. The dynamics of action. New York: Wiley, 1970.

Bruner, J. S. From communication to language -- A psychological perspective. Cognition, 1975, 3, 255-287.

Bullock, D. H. Social coordination and children's learning of property words. Unpublished doctoral dissertation, Stanford University, 1979.

Collins, A. M. & Loftus, E. F. Spreading activation theory of semantic processing. Psychological Review, 1975, 82, 407-428.

Kaye, K. & Charney, R. How mothers maintain "dialogue" with two-year-olds. In D. Olson (Ed.), The social foundations of language and thought. New York: Norton, 1980.

Macnamara, J. Cognitive basis of language learning in infants. Psychological Review, 1972, 79, 1-13.

MacWhinney, B. The acquisition of morphophonology. Monographs of the Society for Research in Child Development, 1978, 43 (Serial No. 174).

MacWhinney, B. A framework for sharing points. In R. Schiefelbusch (Ed.), Communicative competence: Acquisition and intervention. Baltimore, Md.: University Park Press, 1980.

Morton, J. The interaction of information in word recognition. Psychological Review, 1969, 76, 165-178.

Pinker, S. Formal models of language learning. Cognition, 1979, 7, 217-283.

Ratner, N. & Bruner, J. S. Games, social exchange, and the acquisition of language. Journal of Child Language, 1978, 5, 391-401.

Rosch, E. On the internal structure of perceptual and semantic categories. In T. E. Moore (Ed.), Cognitive development and the acquisition of language. New York: Academic Press, 1973.

Rumelhart, D. E. Toward an interactive model of reading. In S. Dornic (Ed.), Attention and performance VI. Hillsdale, N.J.: Erlbaum, 1977.

Schlesinger, I. M. Production and comprehension of utterances. Hillsdale, N.J.: Erlbaum, 1977.

Skinner, B. F. Verbal Behavior. New York: Appleton, 1957.

Wertsch, J. V. From social interaction to higher psychological processes. Human Development, 1979, 22, 1-22.

Wittgenstein, L. Philosophical investigations. New York: Macmillan, 1953.

Table 1

Mothers' Word Use Frequencies

Game Order	Mothers' Word Type	Color Game	Texture Game	Neutral Game
*CNT	Color	43	19	46
	Texture	0	41	68
CTN	Color	54	18	39
	Texture	7	33	42
NCT	Color	16	8	16
	Texture	10	16	5
TCN	Color	45	11	37
	Texture	19	27	49
TNC	Color	28	11	52
	Texture	4	110	28
NTC	Color	14	9	46
	Texture	9	31	44
Total	Color	200	76	236
Total	Texture	49	258	236
Total	C + T	249	334	472

* For each order, N = 4 dyads.

Table 2

Attributes of Experimental Stimuli

Game	Standard	Choice Set Items		
Color	*C_1T_1	C_1T_1	C_2T_1	C_3T_1
	C_2T_2	C_1T_2	C_2T_2	C_3T_2
	C_3T_3	C_1T_3	C_2T_3	C_3T_3
	C_4T_1	C_1T_1	C_2T_1	C_4T_1
	C_4T_2	C_1T_2	C_3T_2	C_4T_2
Texture	C_1T_1	C_1T_1	C_1T_2	C_1T_3
	C_2T_2	C_2T_1	C_2T_2	C_2T_3
	C_3T_3	C_3T_1	C_3T_2	C_3T_3
	C_1T_4	C_1T_1	C_1T_2	C_1T_4
	C_2T_4	C_2T_2	C_2T_3	C_2T_4
Neutral	C_1T_1	C_1T_2	C_2T_1	C_2T_2
	C_2T_2	C_2T_3	C_3T_2	C_3T_3
	C_3T_3	C_3T_4	C_4T_3	C_4T_4
	C_4T_4	C_4T_1	C_1T_4	C_1T_1
	C_1T_1	C_1T_2	C_2T_1	C_2T_2

* C_i = Color value i; T_i = Texture value i.

Table 3

Percentages of C_4 and T_4 Words

Game Order	Word Percent Type	Game Type: Color	Texture	Neutral	Neutral $T4/\Sigma T - C4/\Sigma C$
CNT	C4/ΣC	.140		.043	.236
	T4/ΣT		.122	.279	
CTN	C4/ΣC	.130		.102	.160
	T4/ΣT		.242	.262	
NCT	C4/ΣC	.375		.063	.737
	T4/ΣT		.375	.800	
TCN	C4/ΣC	.111		.081	.205
	T4/ΣT		.519	.286	
TNC	C4/ΣC	.036		.077	.030
	T4/ΣT		.182	.107	
NTC	C4/ΣC	.214		.043	.184
	T4/ΣT		.129	.227	
			Neutral Means	.068	.190
				.258	